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Editorial for AJP-Cell Physiology

Onward and Upward with Transparent Research Reporting

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In 2015, APS Council and the APS Publications Committee, the latter led by Dr. Curt D. Sigmund, began an initiative on the transparency of research reporting in the APS Journals. At this time, concerns over biosciences research reproducibility, especially in areas such as pre-clinical cancer biology research, had become prominent [2, 7, 8]. As of 2017, multiple funding bodies, including the USA National Institutes of Health, have reconfigured their instructions for preparation of grant applications to give more emphasis to methodology, experimental design and the validation of key reagents [e.g., NIH: grants.nih.gov/reproducibility/index.html; UK Medical Research Council: www.mrc.ac.uk/documents/pdf/methodology-and-experimental-design-in-applications-guidance-for-reviewers-and-applicants/].

The APS initiative included discussions between the Publications Committee, Editors of APS Journals and Editorial Advisory Board members on how guidance to authors for manuscript preparation could be aligned with the over-arching goal of enhancing the likelihood of research reproducibility. The discussions highlighted the central issue that any attempt at research reproduction (or extension) depends on access to sufficient information on the reagents, experimental procedures and statistical analyses utilised in the initial research study. Thus one major outcome was that in August 2016 the APS Journals updated their Instructions to Authors for manuscript and figure preparation. At the start of 2017, new questions for reviewers were introduced as part of the peer-review process for original research manuscripts. In this Editorial, I will discuss areas of Methods reporting that are of particular relevance to *AJP-Cell Physiology* and offer some points of guidance to potential authors. Of course, there are many aspects of reagent choice and experimental design that may affect the likelihood of research reproducibility. Several “hot-button” topics, including the selectivity of pharmacological inhibitors, or the specificity and reliability of commercial antibodies, have been addressed recently in *AJP-Cell Physiology* and will not be not covered further here [4, 10].

Many readers of this editorial will be familiar with training graduate students to question their reagents, to be meticulous and timely with record-keeping, and to present comprehensive explanations on methods, reagents and statistical analyses when writing a research thesis. Nevertheless, this level of detail is far removed from the abbreviated style of methods writing that has come to predominate in modern bioscience research papers. From the beginning of the APS discussions, it was clear that certain practices in research reporting were and are a source of frustration for many Editors. Based on outcomes

from the APS discussions a new section has been included in the online APS Information for Authors, "Experimental Details to Report in Your Manuscript" (www.the-aps.org/mm/Publications/Info-For-Authors/Experimental-Details-to-Report). Extended background information is also provided in another new section "Promoting Transparent Reporting" (http://www.the-aps.org/mm/Publications/Info-For-Authors/Promoting-Transparent-Reporting). Prospective authors are strongly advised to consult both of these sections, which set out, in a clear and concise way, certain general expectations for quality control and depth of explanation for methods involving cell lines, antibodies, vertebrate animals, or samples from humans. Minimum standards for reporting on the sources of reagents, the presentation of immunoblots, statistical analyses, mathematical models, or the availability of computer code are covered, along with best practice expectations for the handling and presentation of digital images.

These are all "common-sense" reporting procedures for researchers and prospective authors are presently *encouraged* to adopt these practices. The peer-review policy of APS is that manuscripts are accepted based on their scientific content and the presentation of the material. At *AJP-Cell Physiology*, we wish to promote especially the transparency of reporting for reagents and methods that are core technologies for cell-centric research. For example, in view of the importance of cell lines, strains and primary cultures in many papers published herein, we aim to promote transparency of research reporting of variables related to cell cultures. Articles in *AJP-Cell Physiology* have emphasised the need to report the sex of your cells in the Methods section [12, 13]. Another methodology that features in many *AJP-Cell Physiology* papers is immunoblotting: we expect to see appropriate quantification from immunoblots [9] and the Information for Authors also provides detailed guidance on how immunoblot panels should be annotated. Where needed, we will ask authors to make final minor figure or text corrections before acceptance for publication.

Looking ahead into 2017 and beyond, what other aspects of data presentation would further improve transparency of reporting at *AJP-Cell Physiology*? Many papers published in *AJP-Cell Physiology* present data from multiple independent experiments in the form of bar graphs that display the mean, -/+ standard deviation or standard error of the mean [3]. More general use of the box-and-whisker plot or its variants [6] at *AJP-Cell Physiology* would provide better transparency on the distribution of the underlying data. As the APS Journal that is focused on Cell Physiology, *AJP-Cell Physiology* also receives many manuscripts that address questions of molecular localisation and/or co-localisation in cells, often demonstrated by presentation of digitally-merged, confocal fluorescence microscopy images. Aside from the general debate on the most meaningful method(s) to demonstrate molecular co-localisation, current digital imaging and post-acquisition image analysis software provide many valuable options for quantified analysis of co-localisation from confocal microscopy: we encourage authors submitting to *AJP-Cell Physiology* to embrace these methods. For transparency of reporting, the rationale for the metric chosen, the parameter settings applied, and the tests conducted to assess datapoint distribution [5] need to be stated in the Methods section.

In January 2017, the “Reproducibility Project: Cancer Biology” published the results from its first five projects. These showed mixed success in research replication [11]. Clearly, transparency of reporting is only one aspect of good research practice that may improve research reproducibility and robustness [1], yet it is a rational step that can be applied with clear objectives. For *AJP-Cell Physiology* to meet the goal of enhanced transparency of research reporting will need concerted, stringent, yet benevolent, input from authors, reviewers and editors. Authors should reap benefits when preparing transparency materials for funding applications. For reviewers, the additional questions on the review form aim to make checking of central areas of transparent reporting systematic across all manuscripts. I hope that all contributors to *AJP-Cell Physiology* will be willing to “step up to the plate”. I thank the authors, reviewers and editors who are already putting into practice careful attention to methods reporting. Recent surveys in the USA and the UK attest that scientists are some of the most esteemed [14] or trusted [15] professionals. Striving to increase transparency is a contribution we can make to further strengthen rational, evidence-based advancement of knowledge.

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